

Name(s) of Risk Team Members: A Etkin, A. Warkentien, T. Tallerico			Point Value → Parameter ↓		1		2		3		4		5				
Area/Facility Description Title: Collider-Accelerator Department RHIC Refrigerator Maintenance			Occupancy or Use		≤once/year		≤once/month		≤once/week		≤once/shift		>once/shift				
Area/Facility # (if applicable): FRA 26-07																	
Area/Facility Description: Building 1005R RHIC Refrigerator Room			Severity		First Aid Only		Medical Treatment		Lost Time		Partial Disability		Death or Permanent Disability				
			Likelihood		Extremely Unlikely		Unlikely		Possible		Probable		Multiple				
Approved by: <i>E. Lessard</i> Date: 4-24-07      Rev.#: 0																	
Reason for Revision (if applicable):									Comments:								
					Before Additional Controls							After Additional Controls					
Physical Item or Activity	Hazard(s)	Control(s)			Occupancy A	Severity B	Likelihood C	Risk* AxBxC	Control(s) Added to Reduce Risk				Occupancy A	Severity B	Likelihood C	Risk* AxBxC	% Risk Reduction
Cryogenic fluids and systems	Contact with temperature – extremes that result in such injuries frost bite or burns	Design reviews, ASSRC reviews, Cryogenic safety committee, proof testing, LOTO, work planning, PPE and training, postings, Cryogenic-system designs to consensus codes, inspections, relief valve testing, procedures, work planning			4	2	2	16									
Cryogenic fluids and systems	Oxygen deficiency	ODH analyses, ODH controls, training to ODH 1, interlocked emergency exhaust fans, PPE, remote/local audible/visible alarms, emergency response, EMTs, work planning, POMs, medical clearance, escape pack, MSDS, LOTO, postings, Cryogenic-system designs to consensus codes, inspections, Cryogenic Safety Committee, relief valve testing, procedures, work planning			4	5	2	40									
Pressurized Systems	Being struck by an object due to a pressure release	Postings; PPE; maintenance; training; work planning; Cryogenic Safety Committee /ASSRC reviews; procedures; interlock systems; certification/testing of pressure related equipment; Tier 1 inspections; LOTO; C-AD Chief ME reviews; codes and standards usage			4	3	3	36									
Gases	Oxygen deficiency	ODH analyses, ODH controls, training to ODH 1, interlocked emergency exhaust fans, remote/local audible/visible alarms, emergency response, EMTs, work planning, POMs, medical clearance, escape pack, MSDS, LOTO, postings, Cryogenic system designs to consensus codes, cylinder storage controls, cylinder labels, inspections, procedures, work planning			4	5	2	40									
Hydraulics	Being struck by an object due to a pressure release	Design reviews, ASSRC reviews, proof testing, LOTO, work planning, PPE and training, procedures, spill controls			4	3	3	36									

Cooling water	Being struck by an object due to a pressure release	Design reviews, ASSRC reviews, proof testing, LOTO, work planning, PPE and training, procedures	4	3	3	36					
Confined Spaces	Oxygen deficiency	Training, atmospheric testing before entry and periodically, entry procedures, Permits, work planning, LOTO, respirators, forced ventilation, personnel rescue equipment, emergency planning, EMTs, SBMS, Signs.	2	5	2	20					
Confined Spaces - Metal	Increased chance of shock due to proximity to conducting surfaces	All equipment is listed or reviewed by CEE; work planning; grounding standards; GFCI, LOTO, procedures, training	2	4	2	16					
Electrical equipment & Power Supplies BNL Class A & B <250 V AC, <1000 VDC	Shock or Electrocution	All equipment is listed or reviewed by CEE, Tier 1 inspections, disconnected cable policy, installations comply with applicable codes, procedures, training, distribution drawings, LOTO, energized electrical work permits, NFP 70 E PPE and training, energized electrical work permits, Kirk keys, ASSRC/ESRC reviews, qualified electricians and technicians, cabinet interlocks, postings, locked areas, guarding, work planning, GFCI, grounding standards, emergency procedures. Implementation of a plan to meet OSHA's NRTL requirements	4	4	2	32					
Electrical equipment & Power Supplies BNL Class C <600 V AC, <6000 V DC	Shock or electrocution, arc blast, burn	All equipment is listed or reviewed by CEE, Tier 1 inspections, disconnected cable policy, installations comply with applicable codes, procedures, training, distribution drawings, LOTO, energized electrical work permits, NFP 70 E PPE and training, energized electrical work permits, Kirk keys, ASSRC/ESRC reviews, qualified electricians and technicians, cabinet interlocks, postings, locked areas, guarding, work planning, GFCI, grounding standards, emergency procedures, two-person rule for energized electrical work. Implementation of a plan to meet OSHA's NRTL requirements	4	5	2	40					
MCCs, panels and wall sockets	Shock or electrocution, arc blast, burn	All equipment is listed or reviewed by CEE, Tier 1 inspections, disconnected cable policy, installations comply with applicable codes, procedures, training, distribution drawings, LOTO, energized electrical work permits, NFP 70 E PPE and training, ASSRC reviews, qualified electricians and technicians, cabinet interlocks, postings, locked areas, guarding, work planning, GFCI, grounding standards, emergency procedures	4	5	2	40					
Remotely and automatically operated equipment	Being caught or compressed by equipment	Guarding, training, posting, LOTO	2	3	2	12					
Working At Heights	Falls to a lower level such as falling off a ladder or over a railing	Postings, barriers, fall protection, maintenance, training, work planning, procedures, Tier 1 inspections, PPE, approved scaffolding and platforms, approved ladders, anti-slip surfaces	2	5	3	30					
Vacuum	Ear damage	Postings, PPE, maintenance, training, work planning, ASSRC reviews, procedures, Tier 1 inspections, Chief ME reviews, use of industry standards, design reviews	4	3	2	24					
Vacuum	Being struck by an object such as flying debris due to a vacuum failure	Postings, PPE, maintenance, training, work planning, ASSRC reviews, procedures, Tier 1 inspections, Chief ME reviews, use of industry standards, design reviews	4	3	2	24					

Walking – Working Surfaces	Falls at the same level	PPE; Tier 1; work planning; P.E. scheduled maintenance; internal and external audits; posting; labeling; training; barriers; communication; lessons learned; regular inspection and maintenance of walking and working surfaces; snow shovels and salt made more available in the winter, heightened awareness	4	4	3	48					
Noise	Hearing Loss	Training, Medical surveillance, PPE, postings, IH monitoring, FRA-6 on general noise issues.	4	4	2	32					
Egress	Impaired egress	Tier 1; work planning; skill of craft; P.E. scheduled maintenance; internal and external audits; posting; labeling; training; barriers; communication; internal processes; lessons learned; life safety codes; emergency preparedness, Turbine piping modified to allow acceptable walkway clearance	4	4	2	32					
Storage	Being struck by an object such as a falling tool or materials	Tier 1; inventory control; work planning; postings; labels; barriers; internal and external audits; training; communication; internal procedures; lessons learned, C-AD housekeeping policy.	4	5	2	40					
Chemical Use	Skin exposure	PPE, hazard communication training, specific hazard training, MSDS, SBMS,	3	2	3	18					
Chemical Use	Eye exposure	PPE, hazard communication training, specific hazard training, MSDS, SBMS	3	2	2	12					
Chemical Use	Inhalation	PPE, ventilation, hazard communication training, specific hazard training, MSDS	3	2	2	12					
Hot Surfaces	Contact with temperature – extremes that result in such injuries as burns	Posting, LOTO, PPE, barriers, training, Tier 1, Labels or posting	4	2	2	16					
Further Description of Controls Added to Reduce Risk:											
*Risk:	0 to 20	21 to 40	41-60		61 to 80		81 or greater				
	Negligible	Acceptable	Moderate		Substantial		Intolerable				